

TEPC Microdosimeter for LEO and Beyond, Phase I

Completed Technology Project (2009 - 2009)



Project Introduction

A new generation of Tissue Equivalent Proportional Counters (TEPCs) for micro-dosimetric measurements will be designed, incorporating recent advances in the electronics industry and a new detector configuration. The unit is projected to be 2.5x4.5x1 in, weigh less than 8 oz, and consume less than 100 mW of power. A detector configuration of thirteen half-inch spheres arranged in a 2-D array will be used - twelve connected together to form an equivalent spherical 1.74-inch diameter detector for measuring low fluence environments, and the thirteenth detector connected independently allowing measurements during high fluence periods when the larger detector would saturate (such as during solar particle events). The new electronics will continuously convert the detector data at 1 Mhz. Digital methods will allow both the setting of any threshold and the determination of event peaks, and allow more sophisticated signal processing to be used to reduce noise and eliminate micro-phonics. In addition, a bi-processing method of analyzing the detector signals will allow determination of dose by both integration method and peak method which can then be analyzed to provide accurate total dose readings for the events from the threshold to below 0.05 keV/micron. The spectra below several kev/micron is important as it can contain up to 40% of the total dose. The detector filled with pure propane will simulate a 2 micron site size. Two spectra will be stored each minute, and total integrated dose, dose above threshold, dose equivalent dead-time will be provided every second. The spectra will have 2048 channels at 1 keV/micron for each channel, to a maximum of 2047 keV/micron. The threshold for peak detection and analysis can be set anywhere from 0.4 to 20 keV/micron. The unit will be capable of measurement ranging from less than 100 nGy/hr to over 100 mGy/hr.



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Ames Research Center (ARC)

Responsible Program:

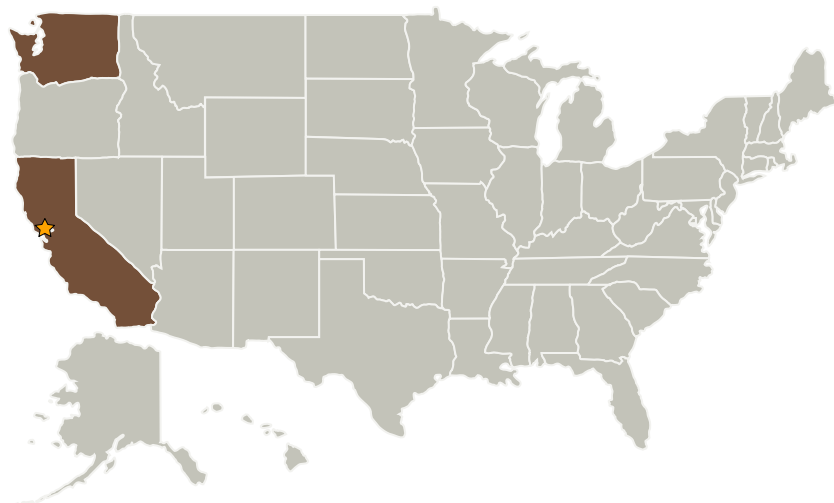
Small Business Innovation Research/Small Business Tech Transfer

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Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★ Ames Research Center(ARC)	Lead Organization	NASA Center	Moffett Field, California
LVI Systems, Inc.	Supporting Organization	Industry	West Richland, Washington

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX08 Sensors and Instruments
 - └ TX08.1 Remote Sensing Instruments/Sensors
 - └ TX08.1.1 Detectors and Focal Planes

Primary U.S. Work Locations

California	Washington
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